US-PAT-NO: 6077392
DOCUMENT-IDENTIFIER: US 6077392 A
TITLE: Text and cover printing paper and process for making the same
DATE-ISSUED: June 20, 2000
INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
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,428/220

DOCUMENT-IDENTIFIER: US 4094736 A
TITLE: Preparation of cellulosic materials

ABPL:
The invention relates to a process for preparing paper or cardboard in which starch and a mineral filler are incorporated into cellulosic fibres. The process uses a blend, which is prepared under specified conditions, of raw starch and starch phosphate. The procedure for incorporating the starch blend and the mineral filler into the cellulosic fibres is also specified.

BSPR:
This invention concerns a filler material which is suitable for filling paper pulp and other cellulosic materials.

BSPR:
Mineral materials such as calcium carbonate, kaolin and titanium dioxide are well known as fillers for cellulosic materials. They can improve the opacity, whiteness and ink receptivity of paper in which they are contained but generally have a deleterious effect on the strength of the paper. Also, because the mineral materials are generally relatively cheap compared with the paper pulp the overall cost per unit weight of paper containing them is reduced. One problem associated with incorporating a mineral filler material in paper pulp is that the mineral particles must be relatively fine, i.e. of diameter about 50 microns or smaller, in order to confer the desirable improvements in opacity, whiteness and ink receptivity. If a mineral material has a particle size distribution such that substantially all of the particles are smaller than 50 microns there will generally be an appreciable proportion of particles having diameters of 1 or 2 microns or smaller. Many of these finer particles will not be retained in the mat of cellulosic

fibres which
forms the paper with the result that some of the mineral filler material passes
through the wire of the papermaking machine in the form of what is known in the
paper-making art as "white water". It is generally difficult to recover
mineral particles and cellulose fibres from white water but regulations
regarding industrial effluents are widely being made more stringent so that
foreign solid materials must be removed from effluent water before it is
discharged to a river or stream.

BSPR:
An object of this invention is to provide an improved filler material for
cellulosic products which confers the advantages of improved brightness,
opacity and ink receptivity and which has less adverse effect on the strength
of the paper as compared with a conventional filler, and is substantially
completely retained in the mat of cellulosic fibres during the paper-making
process.

BSPR:
According to the present invention, there is provided a process for preparing
paper or cardboard which contains a filler composition, which process comprises
(a) suspending raw starch in sufficient cold water to form a suspension
containing about 3 to 10% by weight of starch solids; (b) heating the
suspension thus obtained, with stirring, to a temperature in the range
75.degree.-90.degree. C; (c) adding a starch phosphate to sufficient water so
as to form a suspension or solution containing about 1-10% by weight of the
starch phosphate; (d) adding the starch phosphate solution or suspension to the
suspension of raw starch and raising the temperature of the mixture thus
obtained to within the range of 75.degree.-95.degree. C. and holding its
temperature at that level for about 5 to 10 minutes; (e) agitating the solution

obtained to a
suspension of cellulosic fibres, coagulating the mixed starches by adding a
solution of a salt having a multivalent cation and thereafter raising the pH of
the suspension to above 5.5; and (h) forming the suspension of cellulosic
fibres containing the mixture of mineral and coagulated mixed starches into
sheet material.

CLPR:
12. A process for preparing paper or cardboard which contains a filler
composition, which process comprises the steps of (a) suspending raw potato
starch in sufficient cold water to form a suspension containing about 3 to 10%
by weight of starch solids; (b) heating the suspension thus obtained, with
stirring, to a temperature in the range 75.degree.-95.degree. C; (c) adding a
starch phosphate having a degree of substitution in the range of from 0.02 to
0.1 to sufficient water so as to form a suspension or solution containing about
1-10% by weight of the starch phosphate; (d) adding the starch phosphate
solution or suspension to the suspension of raw starch to form a starch mixture
containing from 5% to 20% by weight of the starch phosphate and from 95% to 80%
by weight of the raw starch and raising the temperature of the mixture thus
obtained to within the range of 75.degree.-95.degree. C. and holding its
temperature at that level for about 5 to 10 minutes; (e) agitating the
solution of mixed starches thus obtained in a high shear mixer for from about 1
to 5 minutes and thereafter allowing the mixed starch solution to cool; (f)
adding the cooled mixed starch solution to a dry powdered mineral filler
material so that the resultant mixed suspension contains about 5-25% dry weight
of the starch mixture and about 95-75% by weight of dry mineral; (g) adding
the mixed suspension thus obtained to a suspension of cellulosic fibres,
coagulating the mixed starches by adding a solution of aluminium

sulphate or
calcium chloride and thereafter raising the pH of the suspension to a value in
the range 5.8 to 6.5; and (h) forming the suspension of cellulosic fibres
containing the mixture of mineral and coagulated mixed starches into sheet
material.

CLPR:
13. A process for preparing paper or cardboard which contains a filler
composition, which process comprises the steps of: (a) suspending raw starch in
sufficient cold water to form a suspension containing about 3 to 10% by weight
of starch solids; (b) heating the suspension thus obtained, with stirring, to
a temperature in the range 75.degree.-95.degree. C; (c) adding a starch
phosphate to sufficient water so as to form a suspension or solution containing
about 1-10% by weight of the starch phosphate; (d) adding the starch phosphate
solution or suspension to the suspension of raw starch and raising the
temperature of the mixture thus obtained to within the range of
75.degree.-95.degree. C. and holding its temperature at that level for about 5
to 10 minutes; (e) agitating the solution of mixed starches thus obtained in a
high shear mixer for from about 1 to 5 minutes and thereafter allowing the
mixed starch solution to cool; (f) adding the cooled mixed starch solution to
a dry powdered mineral filler material so that the resultant mixed suspension
contains about 5-25% dry weight of the starch mixture and about 95-75% by
weight of dry mineral; (g) treating the mixed suspension obtained after step
(f) with a solution of a salt having a multivalent cation so as to coagulate
the starch mixture, raising the pH of the resultant material to above 5.5 and
thereafter adding the resultant suspension to a suspension of cellulosic
fibres; and (h) forming the suspension of cellulosic fibres containing the
mixture of mineral and coagulated mixed starches into sheet material.

CLPR:
24. A process for preparing paper or cardboard which contains a filler composition, which process comprises the steps of: (a) suspending raw potato starch in sufficient cold water to form a suspension containing about 3% to 10% by weight of starch solids; (b) heating the suspension thus obtained, with stirring, to a temperature in the range 75.degree.-95.degree. C; (c) adding a starch phosphate having a degree of substitution in the range of from 0.02 to 0.1 to sufficient water so as to form a suspension or solution containing about 1-10% by weight of the starch phosphate; (d) adding the starch phosphate solution or suspension to the suspension of raw starch to form a starch mixture containing from 5% to 20% by weight of the starch phosphate and from 95% to 80% by weight of the raw starch and raising the temperature of the mixture thus obtained to within the range of 75.degree.-95.degree. C. and holding its temperature at that level for about 5 to 10 minutes; (e) agitating the solution of mixed starches thus obtained in a high shear mixer for from about 1 to 5 minutes and thereafter allowing the mixed starch solution to cool; (f) adding the cooled mixed starch solution to a dry powdered mineral filler material so that the resultant mixed suspension contains about 5-25% dry weight of the starch mixture and about 95-75% by weight of dry mineral; (g) treating the mixed suspension obtained after step (f) with a solution of aluminium sulphate or calcium chloride so as to coagulate the starch mixture, raising the pH of the resultant material to a value in the range 5.8 to 6.5 and thereafter adding the resultant suspension to a suspension of cellulosic fibres; and (h) forming the suspension of cellulosic fibres containing the mixture of mineral and coagulated mixed starches into sheet material.

DOCUMENT-IDENTIFIER: US 3798047 A
TITLE: PIGMENT FOR COATING PAPER AND MANUFACTURE THEREOF

TTL:
PIGMENT FOR COATING PAPER AND MANUFACTURE THEREOF

ABPL:
A pigment for coating paper comprises an intimate mixture of 40-95 parts of natural calcium carbonate and 60-5 parts of satin white, at least 80 percent of the satin white being smaller than two microns. The pigment is prepared by grinding the components together, one of the components being in suspension.

BSPR:
The present invention relates to improvements in white pigments for coating paper and the manufacture thereof.

BSPR:
The most widely used paper coating pigment presently is kaolin because this pigment best meets the usual requirements for such pigments, which are excellent whiteness, great fineness (about 80 percent of the pigment particles being under two microns), great covering power or opacity, and an ability to acquire a shine on calendering.

BSPR:
However, the requirements for printing coated paper are becoming constantly more severe. More particularly, it is desirable to increase the printing speed while obtaining sharp and brilliant printed images, as well as to obtain coated paper useful for offset printing, i.e., a paper which has a good water resistance as well as a high speed of ink absorption.

BSPR:
It has also been proposed to use other pigments for coating paper, such as natural or precipitated calcium carbonates, which modify the structure of the

coating and which thus permit the micro-porosity of the coating to be adjusted.
Despite their whiteness and high covering power or opacity, however,
precipitated calcium carbonates have been used to a limited extent only because
of the high viscosity of their aqueous suspensions. As to the natural calcium
carbonates, while they are cheaper than kaolin and precipitated calcium
carbonates, their use has been limited because they are not white enough and
they do not develop a shine on calendering.

BSPR:
It is the primary object of this invention to overcome the disadvantages of the
known paper coating pigments and to provide such a pigment which gives prints
of good quality while being relatively inexpensive.

BSPR:
Coatings of the pigment of this invention, constituted by an interlacing of
fine needles of satin white crystals with almost spherical particles of calcium
carbonate have a perfectly smooth surface, which facilitates rotogravure
impressions, and an optimum micro-porosity. The physical structure of these
coatings is superior to the lamellar structure of kaolin coatings while being
at least equal thereto in gloss, brightness, smoothness and opacity.
Therefore, these coatings give better printing properties.

DEPR:
The pigment was applied in a thin coating on a black surface and its brightness
was compared with that obtained with the same thickness of a kaolin coating.
The respective brightness, measured by an Elrepho apparatus equipped with a
blue filter which passes light having a wavelength between 4,300 and 4,600 A,
were as follows:

DEPR:
Thus, the pigment, which contained about 85 percent, by weight, of calcium
carbonate and about 15 percent, by weight, of satin white, had a

whiteness
superior to that of the conventional kaolin coating. This pigment, while
useful in other applications, is particularly advantageous for paper coatings
since it also has excellent absorptivity for ink and, in suspension, has a
viscosity lower than that of a kaolin suspension of the same concentration.

DEPR:
Tests showed the resultant product to have a fineness and covering power or
opacity superior to that of satin white obtained by the reaction of aluminum
sulfate and lime.

DEPR:
In the same brightness test as in Example 1, the following results were
obtained:

DEPR:
Thus, the directly produced pigment proved to have the best brightness
characteristics. In addition, the direct method is particularly simple, and
the use of CaCO.sub.3 instead of lime produces considerable economies in
manufacture.

CLPR:
1. A process of preparing a pigment for coating paper, comprising the steps of
preparing a suspension of satin white and grinding the suspension of satin
white with natural calcium carbonate until at least about 80 percent, by
weight, of the resulting pigment has a particle size of less than about two
microns, the amount of satin white and calcium carbonate being such that the
resultant intimate mixture thereof comprises about 95 to 40 parts, by weight,
of calcium carbonate and 5 to 60 parts, by weight, of satin white.

CLPR:
5. A process of preparing a pigment for coating paper, comprising the steps of
grinding natural calcium carbonate in an aqueous suspension with

an amount of
aluminum sulfate sufficient to react only with a portion of the calcium
carbonate to produce satin white until an intimate mixture of the natural
calcium carbonate and satin white is obtained and at least 80 percent, by
weight, of the resulting pigment has a particle size of less than about two
microns, the amounts of calcium carbonate and aluminum sulfate being such that
the intimate ground mixture thereof comprises about 95 to 40 parts, by weight,
of calcium carbonate and 5 to 60 parts, by weight, of satin white.

of mixed starches thus obtained in a high shear mixer for from about 1 to 5 minutes and thereafter allowing the mixed starch solution to cool; (f) adding the cooled mixed starch solution to a dry powdered mineral filler material so that the resultant mixed suspension contains about 5-25% dry weight of the starch mixture and about 95-75% by weight of dry mineral; (g) either adding the mixed suspension thus obtained to a suspension of cellulosic fibres, coagulating the mixed starches by adding a solution of a salt having a multivalent cation and thereafter raising the pH of the suspension to above 5.5; or treating the mixed suspension obtained after step (f) with a solution of a salt having a multivalent cation so as to coagulate the starch mixture, raising the pH of the resultant material to above 5.5 and thereafter adding the resultant suspension to a suspension of cellulosic fibres; and (h) forming the suspension of cellulosic fibres containing the mixture of mineral and coagulated mixed starches into sheet material.

BSPR:
The mechanical working of step (e) improves the behaviour of the starch mixture. The two types of polymer become entangled as a result of the high shear mixing, and this tends to improve the homogeneity of coagulation subsequently effected, as well as improving the association between the mixed starches and the mineral filler particles. Because of the improvement in coagulation effected thereby, the amount of starch which remains in solution is reduced; this is advantageous, because dissolved starch in water ultimately recovered from, for example, the paper making process causes difficulties in the reuse of the water.

DEPR:
Hand sheets of paper filled with starch/clay agglomerates in accordance with the invention were prepared in the following way.

DEPR:
400 g. of bleached sulphite spruce pulp were soaked in 10 liters of water for 4
hours and the mixture was then disintegrated for 10 minutes in a turbine mixer
manufactured by Etablissements Cellier of Aix-les-Bains, France, the impeller
rotating at a speed of 220 r.p.m. The contents of the mixer were washed out
with a further 10 liters of water and transferred to a laboratory beater where
a further 2 liters of water were added and the mixture beaten for 161/2
minutes. At this stage the stock contained approximately 1.8% by weight of dry
pulp. The beating time was chosen to give the optimum compromise between
brightness and strength properties of the stock; this was such that the beaten
pulp had a Canadian Standard Freeness of about 300-320 cc. (This is measured
by placing a 1 liter sample of an aqueous suspension containing 0.3% by weight
of fibres in a container provided with a wire mesh base covered with a water
tight hinged lid. The hinged lid is swung open to allow water draining through
the pulp and through the wire mesh to fall into a large funnel having a narrow
orifice at the base of its central stem and an overflow pipe a given height
above the bottom orifice. The freer the pulp, the more rapidly water falls
into the funnel, and the more water overflows down the pipe provided because
the orifice is too narrow to accommodate the total flow of water. The volume
of water overflowing is measured in a measuring cylinder and the Canadian
Standard Freeness is expressed in cubic centimeters of water). The following
table gives the "single sheet brightness" (percentage reflectance of violet
light of wavelength 458 nm. from the surface of a single sheet of paper having
a dry weight of 60 grams per square meter) and the burst ratio for paper sheets
formed from a bleached sulphite softwood pulp beaten in a Valley "Niagara"
beater to different Canadian Standard Freeness values:

DEPR:
800 ml. of the stock were then made up to 2 liters with water and
disintegrated in a laboratory disintegrator which was operated for 15,000
revolutions of the impeller. The volume of stock was made up to 4 liters and
the consistency was checked by filtering and evaporating to dryness a small
sample and weighing the residue. Water was added if necessary to reduce the
consistency to 0.3% by weight of dry pulp. Filler was added and stirred in by
hand at the rate of 14.5 g of filler per 4 liters of paper fibre stock.

DEPR:
Seven 14.5 g. batches of starch/clay mixture were prepared as in Example 1 and
each batch was treated with a different quantity of a solution of aluminium
sulphate containing 5 g. of Al.sub.2 (SO.sub.4).sub.3.16H.sub.2 O per 100 ml.
of solution. The pH was adjusted to 6.0 with sodium hydroxide, all mixing
being performed by hand so that the reaction product of clay with the starch
was subjected only to very small shearing forces. The clay with its coating of
coagulated starch in the form of sliver-shaped agglomerates was then mixed with
4 liters of paper pulp stock and formed into hand sheets as described in
Example 2 above. The hand sheets from each batch were tested for bursting
strength by the test prescribed in TAPPI Standard No. T 403 os-74. The
bursting strength is defined as the hydrostatic pressure in kilonewtons per
square meter required to produce rupture of the material when the pressure is
increased at a controlled constant rate through a rubber diaphragm to a
circular area 30.5 mm in diameter. The area of the material under test is
intially flat and held rigidly at the circumference but free to bulge during
the test. Samples of each sheet were also weighed dry and then incinerated,
the weight of the dry sample being used to determine the weight

per unit area
of the paper in grams per square meter and the weight of ash to calculate the
percentage of filler material (clay and starch) based on the weight of dry
fibres after allowing for the loss on ignition of the filler and also to
calculate the percentage by weight of the added filler material which was
actually retained by the fibres.

DEPR:
The burst strengths were divided by the weight per unit area of the paper to
give a burst ratio and the burst ratio for each sheet of filled paper was then
expressed as a percentage of the burst ratio for a sheet of paper prepared from
the same stock but containing no filler.

DEPR:
As a comparison, hand sheets were also prepared from the same paper stock but
containing as the filler only the English china clay described in Example 1.
Burst ratios and percentages by weight of inorganic filler material were
determined for two different filler loadings.

DEPR:
These results show that, for a given loading of filler, the strength of the
paper is reduced less by the addition of china clay treated with a mixture of
potato starch and starch phosphate coagulated by aluminium sulphate in
accordance with the invention than by the addition of untreated china clay.
However sufficient aluminium sulphate, i.e. at least 0.5 ml of 5% solution per
14.5 g. of starch/clay mix or about 0.17% by weight based on the total weight
of filler, must be added in order to coagulate the starch and starch phosphate
fully and thus achieve good retention of the filler and a good improvement in
strength over that obtained with a similar quantity of untreated china clay.
These results may be compared with the results hitherto obtainable as
exemplified by U.S. Pat. No. 3,132,066. The first three

entries in following
Table III are derived from Example 23 of this U.S.
Specification, while the
remaining entries are derived from Table II above:

DEPR:
The above results show that when titanium dioxide is treated with starch
phosphate in accordance with U.S. Pat. No. 3,132,066 the retention of
titanium dioxide is unaffected. However when china clay is treated with a
mixture of potato starch and starch phosphate coagulated by aluminium sulphate
in accordance with the invention not only is the strength of the paper for a
given loading of filler increased, but the retention of the filler is increased
also.

DEPL:
It can be seen that increasing the beating time so as to reduce the freeness
from 280 to 137 results in a small improvement in strength at the expense of a
significant drop in brightness.

DEPL:
The results from U.S. Pat. No. 3,132,066 are not directly comparable with the
results obtained by the process of this invention because the quantity of
filler used, as well as the nature of the filler, are very different from those
employed in the process of the invention. It is well known that if starch is
added to paper pulp in quantity similar to that used in U.S. Pat. No.
3,132,066 the burst strength of the paper formed from the treated pulp is
greater than that of paper formed from untreated pulp. It is also known that
the effect of adding titanium oxide, or other mineral filler, to the pulp is to
reduce the burst strength of the paper formed. However in the particular case
described in U.S. Pat. No. 3,132,066 the amount of titanium dioxide added is
very small so it is not surprising that the beneficial action of the starch
more than counteracts the deleterious action of the titanium

dioxide. It is
the aim of our invention to incorporate in the paper much greater quantities of
filler without reducing the strength to an undesirable level and so produce a
paper which has a higher proportion of the relatively inexpensive filler
material and a smaller proportion of the expensive paper pulp.

DEPC:
Preparation of paper hand sheets

DETL:
Table I

Canadian Standard Freeness	Single Sheet Brightness	Burst	(c.c.)	(%)	Ratio
642	70.5	18			
468	65.0	35			
280	59.3	47			
137	55.3	50			

CLPR:
1. A process for preparing paper or cardboard which contains a filler
composition, which process comprises the steps of (a) suspending raw starch in
sufficient cold water to form a suspension containing about 3 to 10% by weight
of starch solids; (b) heating the suspension thus obtained, with stirring, to
a temperature in the range 75.degree.-95.degree. C; (c) adding a starch
phosphate to sufficient water so as to form a suspension or solution containing
about 1-10% by weight of the starch phosphate; (d) adding the starch phosphate
solution or suspension to the suspension of raw starch and raising the
temperature of the mixture thus obtained to within the range of
75.degree.-95.degree. C. and holding its temperature at that level for about 5
to 10 minutes; (e) agitating the solution of mixed starches thus obtained in a
high shear mixer for from about 1 to 5 minutes and thereafter allowing the
mixed starch solution to cool; (f) adding the cooled mixed starch solution to
a dry powdered mineral filler material so that the resultant mixed suspension
contains about 5-25% dry weight of the starch mixture and about 95-75% by
weight of dry mineral; (g) adding the mixed suspension thus

US-PAT-NO: 6105325

DOCUMENT-IDENTIFIER: US 6105325 A

TITLE: Method, assembly and additional coat for the construction of interior works

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The other sheet of plasterboards has a visible face, called a lining face, of a colour generally lighter than the grey sheet. To obtain this lighter colour, the layer or layers of this face are based on chemical pulp, if appropriately bleached, composed of recycled and/or new cellulose fibres, and/or on mechanical pulp, if appropriately bleached. By chemical pulp is meant a pulp obtained by eliminating a very large proportion of the non-cellulose components from the raw material by chemical treatment, for example, by cooking in the presence of suitable chemical agents, such as soda or bisulphites. When this chemical treatment is completed by bleaching, a large part of the coloured substances is eliminated, as well as the substances which risk decomposing by ageing and giving unpleasant yellow shades associated with the presence of, for example, lignin.

in a continuous centrifuge to remove oversize material followed by leaching to remove iron-based colored compounds. In the leaching process the kaolin is acidified with H.sub.2 SO.sub.4 to a pH of 3.0 to solubilize the iron. Sodium hydrosulfite is then added to reduce the iron to a more soluble ferrous form which is removed during the dewatering process. The flocculated clay, generally at approximately 30% solids by weight, is then filtered, such as by dewatering on a rotary vacuum filter to a solids level approximately 60% by weight. The filter cake is then either dried or redispersed with additional dry clay if it is to be sold as approximately 70% by weight solids slurry. To produce high brightness products, i.e., a product having a brightness index greater than 90, impurities may be removed from the kaolin clay by further processing the kaolin clay through flotation or magnetic separation. To produce a delaminated product, the coarse fraction from the initial centrifugation is ground in sand grinders to shear the stacks of platelets normally found in kaolin and thereby produce individual particles having an equivalent spherical diameter less than 2 microns.

BSPR:
It is well appreciated in the art that kaolin clay pigments must have certain rheological and optical properties to be suitable for use in paper manufacture as paper coatings or paper fillers. The kaolin clay pigment must be available as a high solids suspension typically having a clay solids content of about 50% to about 70% by weight, but still exhibiting a viscosity low enough to permit efficient and economical pumping, mixability with other filler or coating components, and application to the paper. Additionally, it is of utmost importance that the kaolin pigment exhibit certain optical properties, namely high brightness, high gloss and high opacity.

BSPR:
The influence of particle size distribution upon the optical properties of kaolin pigments has long been appreciated in the art. For example, in commonly assigned U.S. Pat. No. 2,992,936, Rowland discloses that a kaolin clay product having the following particle size distribution (in terms of equivalent spherical diameter, e.s.d.) will consistently show improved brightness, gloss and opacity when used as a paper coating clay:

BSPR:
In a paper entitled "Chemically Induced Kaolin Floc Structures for Improved Paper Coating", presented at the 1983 TAPPI Coating Conference, W. H. Bundy et al. disclosed an improved high bulking paper coating pigment, referred to as 1089, which comprises a chemically modified kaolin produced by the Georgia Kaolin Company, Inc. and marketed under the trade name Astra-Lite. Structures of optimum functionality are said to be derived by chemically treating a base kaolin clay having a particle size distribution wherein from about 80% to 93% by weight of the kaolin particles are less than 2 microns e.s.d. to selectively flocculate a portion of the submicron fines therein thereby aggregating a portion of these fines on the surface of larger kaolin platelets and effectively inactivating a large portion of colloidal particles. Such a chemically modified kaolin coating pigment derived from a base kaolin wherein 92% by weight particles under 2 microns is presented by Bundy et al. as having a particle size distribution as follows:

BSPR:
There is disclosed in U.S. Pat. No. 4,738,726, an opacifying pigment composition suitable for use as a paper filler or coating which consists essentially of particles of hydrous kaolin clay flocculated with a controlled minor amount of a cationic polyelectrolytic flocculent, e.g., a

quaternary
ammonium polymer salt or a diallyl ammonium polymer salt. The base kaolin clay
is selected to have a particle size distribution prior to flocculation wherein
less than 35% by weight are finer the 0.3 microns, i.e., colloidal.

DEPR:
All surface areas herein referred to are determined by a slightly modified
version of the standard methylene blue spot test procedure outlined by M. J.
Nevins and D. J. Weintritt in an article entitled "Determination of Cation
Exchange Capacity by Methylene Blue Adsorption", published in the American
Ceramics Society Bulletin, Volume 46, pages 587-592, 1967. In accordance with
this procedure, a one gram sample of powdered kaolin clay prepared by spray
drying and pulverizing the underflow kaolin slurry produced after defining via
controlled centrifugation was weighed into a 100 ml. beaker. Ten milliliters
of deionized water was then added and the aqueous clay suspension in the beaker
continuously agitated with a magnetic stirrer and stirring bar while methylene
blue stock solution was added in 0.5 milliliter increments. Approximately one
minute after each addition of methylene blue, a drop of liquid was removed from
the beaker with a glass rod and deposited on a piece of Whatman #50 filter
paper. The addition of methylene blue ceased when the dye first appeared as a
blue ring surrounding the dyed solids formed on the filter paper, the blue ring
indicating unabsorbed dye. The suspension was then mixed for an additional two
minutes after the initial appearance of the blue ring to assure maximum
adsorption of the dye by the clay solids in the suspension. An additional drop
was then removed from the beaker and placed on the filter paper. If the blue
ring again appeared, the test was considered completed. If not, the addition
on methylene blue stock was continued in 0.5 milliliter increments until a

stable blue ring was obtained.

DEPR:
The underflow aqueous kaolin clay suspension 35 from the centrifugation step is collected as the desired product and further processed according to its intended use. For example, if the product is to be used as a paper coating clay, the underflow aqueous kaolin clay suspension 35 from the centrifugation step, which is typically at a solids content of about 40% to about 50% by weight, is first diluted with water to a solids content of about 15% to about 25% solids by weight, treated with sulfuric acid to reduce its pH to a level between 2.5 and 3.0, and leached in a conventional manner by adding thereto an aqueous solution of a reducing agent, for example sodium dithionite solution at a treatment level of 2 to 6 pounds of sodium dithionite per ton of dry clay. After leaching to improve brightness, the pH of the leached aqueous kaolin clay suspension is adjusted to 3.0, filtered on a rotary vacuum filter, rinsed and reblunged. A portion of this suspension is then spray dried and the spray dried product pulverized and remixed with the remainder of the suspension to produce the desired coating clay product at a solids level about 65% solids by weight.

DEPR:
If, however, the underflow aqueous kaolin clay suspension 35 from the centrifugation step is to be used for paper filling applications, the underflow aqueous kaolin clay suspension 35 is again first diluted with water to a solids content of about 15% to about 25% solids by weight, but thence prior to leaching is treated with an amine, typically hexamethylenediamine at a treatment level of about 0.5 to about 2.5 pounds hexamethylenediamine per ton of dry clay, before adjusting the pH of the treated suspension to a level between 2.5 and 3.0, thence preferably adding aluminum sulfate

(alum) to the
amine treated suspension, typically at a rate of about 10 to about 20 pounds of
alum per ton of dry clay, after leaching and further processing the aqueous
clay suspension as hereinbefore described with respect to the production of a
coating clay product.

DEPR:
A comparison of the opacity improvements presented in Table I also confirms
that defining by the two-step process of the present invention (Examples IV and
V) wherein the underflow suspension, i.e., the coarse cut, from the first
centrifugation step is subjected to a second centrifugation step and the
overflow suspensions from both centrifugation steps, yields a defined product
which exhibits a substantially greater opacity improvement when compared to a
product defined at the same defining level but defined by the typical prior art
two-step centrifugation exemplified by Example I wherein the overflow
suspension, i.e., the finer cut, from the first centrifugation step is
subjected to a second centrifugation step and the underflow suspensions from
both the first and second centrifugation steps combined to yield the defined
product as described in U.S. Pat. No. 2,992,936.

DEPR:
The treated and untreated products prepared as presented in Example VIII where
used in formulate paper coating compositions by admixing 100 parts by weight of
the sample product, 12 parts by weight of a latex binder, 6 parts by weight of
a starch binder, and 1 part by weight of calcium stearate. For comparison
purposes, coating compositions were also prepared via this formulation using a
No. 1 coating clay and a No. 1 high brightness kaolin. Each coating
formulation was then applied to a 47 lb/3300 ft.sup.2 basestock paper at a
coating weight of 7.1 lb/3300 ft.sup.2. The coated sheets were then calendered

two nips at 140.degree. and 200 psi pressure, before measurements of opacity, brightness, paper gloss and print gloss were taken in accordance with standard TAPPI methods, which measurements are reported in Table II.

DEPR:
A comparison of the opacity, brightness, the paper gloss and print gloss of the paper coatings prepared using the defined kaolin products of Example VIII, both treated and untreated, with those of paper coatings prepared using standard No. 1 coating clay or No. 1 high brightness clay clearly confirms that a defined kaolin clay produced not only by defining at low solids level in accordance with the present invention, but also prepared prior to defining by mechanically dispersing the aqueous kaolin clay via scrub grinding to break up kaolin agglomerates prior to chemically dispersing the suspension to minimum viscosity before defining, will exhibit superior performance as a coating clay with or without subsequent surface treatment.

DETL:
TABLE II

Clay in Coating	Opacity	Brightness	Paper Gloss	Print Gloss
High Brightness No. 1	87.6	79.3	59	79
No. 1 Coating	87.7	78.2	58	79
Ex. VIII - Treated	88.8	80.7	69	88
Ex. VIII - Untreated	88.7	80.6	67	86

DERWENT-ACC-NO: 1999-217091
DERWENT-WEEK: 200046

TITLE: Paper web production for making coated fine papers

INVENTOR: LESKELAE, M; NYGARD, S ; PITKAENEN, M

PATENT-ASSIGNEE: METSAE-SERLA OYJ[METSN], METSAE-SERLA OY[METSN]

PRIORITY-DATA: 1997FI-0003704 (September 16, 1997)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 3085935 B2	September 11, 2000	N/A	007	D21H 011/10
EP 908557 A1	April 14, 1999	E	011	D21H 011/10
FI 9703704 A	March 17, 1999	N/A	000	D21B 000/00
FI 103417 B1	June 30, 1999	N/A	000	D21B 001/00
CA 2247307 A1	March 16, 1999	E	000	D21H 011/10
JP 11189983 A	July 13, 1999	N/A	023	N/A

DESIGNATED-STATES: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK N
L PT RO SE SI

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
JP 3085935B2	N/A	1998JP-0262004	September 16, 1998
JP 3085935B2	Previous Publ.	JP 11189983	N/A
EP 908557A1	N/A	1998EP-0660093	September 16, 1998
FI 9703704A	N/A	1997FI-0003704	September 16, 1997
FI 103417B1	N/A	1997FI-0003704	September 16, 1997
FI 103417B1	Previous Publ.	FI 9703704	N/A

CA 2247307A1 N/A 1998CA-2247307
September 16, 1998
JP 11189983A N/A 1998JP-0262004
September 16, 1998

INT-CL_(IPC): D21B000/00; D21B001/00 ; D21H011/10 ;
D21H019/72 ;
D21H019/82

ABSTRACTED-PUB-NO: EP 908557A
BASIC-ABSTRACT: NOVELTY - A paper web is formed from a fibrous raw material
stock on a conventional papermaking machine. The stock contains 20-70 % by dry
weight of mechanical pulp from Poplar trees. The remainder of the stock is
70-30 % by weight of bleached chemical softwood pulp.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for (1) a base
paper of which 30-60 wt% of its fibers are derived from a mechanical aspen
pulp, 70-40 wt% from chemical softwood pulp, its grammage is 30-200 g/m2,
1.2-1.6 cm3/g and opacity and brightness over 78%; and (2) fine paper produced
from double-coated base paper, in which at least one of the coating layers is
formed from a coating color containing pigment with a steep particle size
distribution.

USE - To provide a base paper web suitable for use in making coated fine
papers.

ADVANTAGE - Addition of mechanical pulp as pressure groundwood pulp from Poplar
trees with short fibers increases the bulk and light scattering of the paper.

CHOSEN-DRAWING: Dwg.0/0

TITLE-TERMS:
PAPER WEB PRODUCE COATING FINE PAPER

DERWENT-CLASS: F09

CPI-CODES: F05-A06;

UNLINKED-DERWENT-REGISTRY-NUMBERS: 1278U

SECONDARY-ACC-NO:
CPI Secondary Accession Numbers: C1999-064122

DERWENT-ACC-NO: 1996-161666
DERWENT-WEEK: 199819

TITLE: Improved optical properties of paper i.e. increased brightness - by
using as filler, blocky six sided rhombohedral calcium carbonate with crystal
morphology, having specific surface area

INVENTOR: KUNESH, C J; PASSARETTI, J D

PATENT-ASSIGNEE: MINERALS TECHNOLOGIES INC[MINEN], PFIZER INCECHNOLOGIES
INC[PFIZ]

PRIORITY-DATA: 1990US-0493075 (March 13, 1990)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
ES 2112602 T3	April 1, 1998	N/A	000	C01F 011/18
EP 703315 A2	March 27, 1996	E	025	D21H 017/67
EP 703315 A3	June 26, 1996	N/A	000	N/A
EP 703315 B1	January 14, 1998	E	026	C01F 011/18
DE 69128730 E	February 19, 1998	N/A	000	C01F 011/18

DESIGNATED-STATES: BE CH DE ES FR GB IT LI NL SE BE CH DE ES FR GB IT LI NL SE

CITED-DOCUMENTS: EP 10643; EP 179597 ; GB 540044 ; US 3320026

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
ES 2112602T3	N/A	1995EP-0118362	March 5, 1991
ES 2112602T3	Based on	EP 703315	N/A
EP 703315A2	Div ex	1991EP-0301797	March 5, 1991
EP 703315A2	N/A	1995EP-0118362	March 5, 1991

EP 703315A3	Div ex	1991EP-0301797
March 5, 1991		
EP 703315A3	N/A	1995EP-0118362
March 5, 1991		
EP 703315B1	Div ex	1991EP-0301797
March 5, 1991		
EP 703315B1	N/A	1995EP-0118362
March 5, 1991		
EP 703315B1	Div ex	EP 447094
N/A		
DE69128730E	N/A	1991DE-0628730
March 5, 1991		
DE69128730E	N/A	1995EP-0118362
March 5, 1991		
DE69128730E	Based on	EP 703315
N/A		

INT-CL_(IPC): C01F011/18; C09C000/00 ; D21H017/67

RELATED-ACC-NO: 1991-275702;1996-161576

ABSTRACTED-PUB-NO: EP 703315A
BASIC-ABSTRACT: Improved optical properties of paper made from calcium
carbonate having a blocky six-sided rhombohedral final crystal morphology, is
claimed. It has a surface area of 3 - 15 m2/g and an average discrete particle
size of 0.2 - 0.9 mum. The discrete particles have an aspect ratio of less
than 2 and a particle size distribution such that at least 60 wt.% of the
particles lie within 50% of the equivalent discrete particle average spherical
dia.

USE - As a filler material in paper making.

ADVANTAGE - Improves the optical properties of paper i.e. increased brightness
and opacity.

ABSTRACTED-PUB-NO: EP 703315B
EQUIVALENT-ABSTRACTS: Improved optical properties of paper made from calcium
carbonate having a blocky six-sided rhombohedral final crystal morphology, is
claimed. It has a surface area of 3 - 15 m2/g and an average discrete particle
size of 0.2 - 0.9 mu m. The discrete particles have an aspect ratio of less

than 2 and a particle size distribution such that at least 60 wt.% of the
particles lie within 50% of the equivalent discrete particle average spherical
dia.

USE - As a filler material in paper making.

ADVANTAGE - Improves the optical properties of paper i.e. increased brightness
and opacity.

CHOSEN-DRAWING: Dwg.0/19 Dwg.0/19

TITLE-TERMS:
IMPROVE OPTICAL PROPERTIES PAPER INCREASE BRIGHT FILL SIX SIDE RHOMBOHEDRA L
CALCIUM CARBONATE CRYSTAL MORPHOLOGY SPECIFIC SURFACE AREA

DERWENT-CLASS: E33 F09 G01

CPI-CODES: E34-D03; F05-A06D; G01-A01;

CHEMICAL-CODES:
Chemical Indexing M3 *01*
    Fragmentation Code
    A220 A940 C106 C108 C530 C730 C801 C802 C803 C805
    C807 M411 M781 M903 M904 M910 Q324 Q333 Q606 R032
    Specfic Compounds
    01278U
    Registry Numbers
    1278U

UNLINKED-DERWENT-REGISTRY-NUMBERS: 1278U

SECONDARY-ACC-NO:
CPI Secondary Accession Numbers: C1996-051258

DERWENT-ACC-NO: 1990-254341
DERWENT-WEEK: 199034

TITLE: High opacifying kaolin contg. pigments - useful as fillers in paper
sheets

INVENTOR: DUNAWAY, W; TURNER, R E

PATENT-ASSIGNEE: ECC AMERICA INC[ENGC]

PRIORITY-DATA: 1988US-0288681 (December 22, 1988)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
AU 8947058 A	June 28, 1990	N/A	000	N/A
BR 8906697 A	September 11, 1990	N/A	000	N/A
US 5047375 A	September 10, 1991	N/A	000	N/A

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
AU 8947058A	N/A	1989AU-0047058	December 21, 1989
US 5047375A	N/A	1988US-0288681	December 22, 1988

INT-CL (IPC): B03D001/02; C04B033/00 ; C09C001/42 ; C09C003/04 ;
D21H003/82

ABSTRACTED-PUB-NO: AU 8947058A
BASIC-ABSTRACT: Iron stained TiO2 contg. kaolin (I) is beneficiated esp. by
froth flotation and froth rejects obtd. comprising kaolin enriched in iron
stained TiO2 are dewatered, dried and calcined at 1500-2200 deg. F to obtain
pigment prod. (II). Starting material (I) is pref. a naturally occurring
kaolin contg. 1-2 wt.% TiO2. Enriched kaolin contains e.g. 2-15% TiO2.

USE/ADVANTAGE - When used as a filler in paper, prod. (II)

imparts a brightness
of 60-90 and paper has enhanced opacity compared to calcined kaolins not
enriched in TiO2. (II) enhances puritability of newsprint grade paper.
Retention of (II) in paper web is higher.

ABSTRACTED-PUB-NO: US 5047375A
EQUIVALENT-ABSTRACTS: Prodn. of high opacifying pigment comprises subjecting an
iron-stained titania-contg. kaolin to froth flotation, recovering froth
rejects" which contain kaolin enriched in the iron-stained titania. Enriched
kaolin contains 2-15 wt.% titania. Froth "rejects" are dewatered and dried.
The rejects are then calcined at 1500-2200 deg.F. Pref. froth "rejects" are
not further beneficiated prior to calcining. Esp. starting material is a
naturally occurring kaolin contg. 1-2 wt.% titania.
USE/ADVANTAGE - Kaolin
pigment is useful as a filler in paper prods. Pigment has high opacity.

(5pp)

CHOSEN-DRAWING: Dwg.0/1

TITLE-TERMS:
HIGH OPAQUE KAOLIN CONTAIN PIGMENT USEFUL FILL PAPER SHEET

DERWENT-CLASS: F09 G01 P41

CPI-CODES: F05-A06D; G01-A05; G01-A08; G01-A10;

SECONDARY-ACC-NO:
CPI Secondary Accession Numbers: C1990-110149
Non-CPI Secondary Accession Numbers: N1990-197128

DOCUMENT-IDENTIFIER: US 5168083 A
TITLE: High opacity defined kaolin product and method of producing same

BSPR:
The present invention relates to a defined kaolin composition exhibiting high opacity and to a method of producing the kaolin composition by controllably defining a kaolin clay. More specifically, the present invention relates to a beneficiated kaolin product having improved opacifying efficiency thereby rendering the product functional as a high performance paper coating or filler, and to a method of producing the beneficiated kaolin product by controllably defining and otherwise treating a base kaolin clay so as to remove a substantial portion of colloidal particles therein.

BSPR:
It is well known in the paper industry, that a wide variety of pigments, such as titanium dioxide, calcium carbonate, talc, synthetic silicates, and clays such as bentonite and kaolin, are suitable for use as paper fillers and/or coatings. Kaolin, a naturally occurring hydrated aluminum silicate, is presently the most widely utilized and is available in a range of particle sizes and brightnesses, as well as being either delaminated or non-delaminated. Hydrated kaolin is white in color, has a fine particle size, is relatively chemically inert, and makes an ideal low cost paper filler. Although calcined (anhydrous) kaolin is also available for use as a paper filler and can impart greater opacity to paper than the hydrated kaolin, it has the serious disadvantage of being more abrasive.

BSPR:
Prior art kaolin paper fillers and coatings are typically produced by a beneficiation process which typically consists of fractionating